

Empirical approach to evaluate carbon emissions of different waste management strategies for building refurbishment projects: towards a circular economy

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Abstract

Purpose

Due to the rapid development of urbanization, China produces significant amount of construction and demolition waste (C&DW) every year. The government has promoted the building refurbishment to prevent large-scale demolition and reconstruction. Although many efforts have been made in the field of C&DW management, few studies have focused on the management of C&DW generated by refurbishment, and no study has been made on the carbon emissions assessment by C&DW in the life cycle of refurbishment project in China. Therefore, through a case study project, this project uses the life cycle assessment method to evaluate the carbon emissions of different waste management strategies of refurbishment project in China.

Method

Three waste management scenarios have been developed for an educational building refurbishment project in Suzhou, China. Scenario 1 is in business as usually C & DW management practice of China; Scenario 2 is focuses on the downstream impact of waste reuse, reduce and recycle; Scenario 3 is based on circular economy, which considers the upstream and downstream influence of waste.

Results

This study fills the research gap in assessing the carbon emissions of different waste management strategies of refurbishment project. The results shows that the waste generated by BR is different from construction and demolition projects. In the life cycle of BR waste management, the carbon emissions in the material stage are the highest compared with the disassembly, construction and end of life stages. The traditional 3R strategy is based on linear economy and depends on the unsustainable growth demand for raw materials, while the circular economy considers material circularity. The carbon emission of scenario 2 has slightly difference compare with scenario 1. As scenario 3 uses recycled materials to replace new raw material consumption, the total carbon emissions are significantly reduced.